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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/880,616	06/23/1997	MITCHELL ADAM COHEN	YO997-111	2216

7590   08/15/2003

Anne Vachon Dougherty
3173 Cedar Road
Yorktown Heights, NY   10598

EXAMINER
LAO, SUE X

ART UNIT	PAPER NUMBER
2126	

DATE MAILED: 08/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

		Applicati n N .	Applicant(s)
Office Action Summary		08/880,616	COHEN ET AL.
		Examin r	Art Unit
		S. Lao	2126

-- The MAILING DATE f this communication appears n the cover sheet with th correspondence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>22 January 2003</u> .

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-14 and 16-20</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-14 and 16-20</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

     If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☐ All b) ☐ Some * c) ☐ None of:

         1. ☐ Certified copies of the priority documents have been received.

         2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

     a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .	6) ☐ Other: .

DETAILED ACTION

1.   Claims 1-14, 16-20 are pending. This action is in response to the appeal brief filed 1/22/2003.

2.   Upon further consideration of applicant's arguments filed 1/22/2003, the finality of the rejection of the last Office action is withdrawn.

3.   The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4.   Claims 2, 4, 6, 8-11, 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

       Claim 2 recites "said at least one computing node" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

       Claim 4 recites "said scheduler" in line 3. There is insufficient antecedent basis for this limitation in the claim.

       Claim 6 recites "said scheduler means" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

       Claims 8 and 9 recite "said global scheduler" in lines 1-2. There is insufficient antecedent basis for this limitation in the respective claims.

       Claim 10 recites "said scheduler" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

       Claim 11 recites "said more than one computing node" in line 14. There is insufficient antecedent basis for this limitation in the claim.

       Claim 13 recites "said scheduler means" in line 14. There is insufficient antecedent basis for this limitation in the claim. For the purpose of art rejection, it is interpreted as "a scheduler means", as best understood and as it appears to be. Claim

13 also recites "communicating said prioritized schedule" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. For the purpose of art rejection, it is interpreted as "communicating said global prioritized schedule", as best understood and as it appears to be.

5.   Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zolnowsky (U S Pat. 5,826,081).

As to claim 1, Zolnowsky teaches an apparatus in a UNIX-based environment (SunOS Solaris) for providing scheduling at one time of a plurality of tasks (tasks, processes/threads) of more than one application (applications) among processes in more than one computing node (processors 1, 2, ..., N), each node having a plurality of local processes (threads in processors' own dispatch queues 509, 515, ..., 521), comprising:

global scheduler means (global dispatch queue / real time queue 501) for dynamically (real time) creating a global prioritized schedule (higher priority real time threads) of the plurality of tasks of the more than one application to allow execution (execution) of different tasks of more than one application at the same time at the computing nodes (run on multiprocessor system); and

at least one local scheduler (processor's own scheduler 505, 511, ..., 517) associated with each of the more than one computing node comprising means for receiving (processor selects and takes a higher priority thread from real time queue 501) the global prioritized schedule (real time queue 501), means for ascertaining (assignment decision) which of the plurality of tasks are assigned tasks (higher priority thread from real time queue 501), being assigned to each of the plurality of local processes (verification step 604), means for prioritizing the assigned processes [it is noted that each processor's scheduler schedules and dispatches based on a priority algorithm], and means to update a local priority list (threads in processor's dispatch queues 509, 515, ..., 521) in accordance with the global prioritized schedule (run higher priority real time threads before running lower priority threads in processor's dispatch

queue) to allow simultaneous execution of tasks from the more than one application (run application on multiprocessor system). See col. 5, lines 7-58; col. 6, lines 27-52; col. 8, lines 13-54.

Zolnowsky does not explicitly state that the updating process involves a step of including the assigned processes into the local priority list. However, logically, all the runnable candidate threads in Zolnowsky, whether threads taken from the real time dispatch queue or threads already located in the processor's local dispatch queue, are placed in the processor's local dispatch queue and ordered according to their priorities before the higher priority thread is dispatched and run based on priority scheduling. In addition, Zolnowsky teaches that each scheduler places a runnable candidate thread into its local priority list / dispatch queue before servicing the thread (col. 6, lines 43-52; col. 9, lines 45-50). Therefore, it would have been obvious to logically or physically include / place an assigned processes / runnable candidate thread into the local priority list during an updating / scheduling process in each processor.

As to claim 2, Zolnowsky teaches at least one operating system for receiving input from the means for prioritizing and for directing the assigned processes to execute the tasks in accordance with the prioritizing (SunOS Solaris, col. 5, lines 45-58).

As to claim 3, Zolnowsky teaches the operating system is further adapted to interleave the execution of local tasks with the tasks (SunOS Solaris is multiprocessing/multitasking).

As to claim 4, Zolnowsky teaches application coordinator means for communicating information (real time application scheduling requirements) about the plurality of tasks to the scheduler for use in dynamically creating the schedule (col. 6, lines 43-52).

As to claim 5, Zolnowsky teaches the local processes are adapted to perform tasks in parallel (Solaris being multiprocessing/multitasking).

6.   Claims 6-14, 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zolnowsky as applied to claims 1, 2 in view of Cameron et al (U S Pat. 5,3325,526).

As to claim 6, note discussion of claim 1 for dynamically scheduling. Cameron teaches task scheduling in a multicomputer system, including global scheduling means (allocator and scheduler component 612) for communicating the prioritized schedule to the at least one local scheduler (operate in conjunction with partition 614 to assign tasks to nodes, col. 7, lines 43-52). Given the teaching of Cameron, it would have been obvious to include a means for communicating into Zolnowsky. One of ordinary skill in the art would have been motivated to combine the teachings of Zolnowsky and Cameron because Cameron recognizes that a current task/process/thread priority may dynamically change as the priorities of associated application programs or a portion thereof change priority (col. 7, lines 56-68), which would have been desirable for Zolnowsky as the threshold value for real time threads was set/re-set (col. 10, lines 1-13).

As to claim 7, Cameron teaches the local scheduler is adapted to communicate information about the plurality of local processes to the global scheduler (col. 14, lines 12-31). Note discussion of claim 6 for a motivation to combine.

As to claim 8, Zolnowsky as modified teaches the global scheduler further comprises timer means associated with the communication means to periodically effect communication of the dynamically created prioritized schedule to the local schedulers in that dynamic scheduling occurs at the end of each time slice wherein scheduling operations are performed (as taught by Zolnowsky, col. 8, lines 55-64), including communicating schedule information (Cameron, see discussion of claim 6).

As to claim 9, Cameron teaches the global scheduler includes at least one table comprising the identity and address for each of the at least one local scheduler (hash tables for locating partitions, col. 13, lines 15-33). Note discussion of claim 6 for a motivation to combine.

As to claim 10, note discussion of claim 6.

As to claim 11, it is a method claim of claims 1, 6 and 7. Note discussion of claim 1 for UNIX-based computing environment, tasks, application(s), node, processes / local processes, global scheduler means, local scheduler and the steps of dynamically creating and dynamically prioritizing. Note discussion If claim 6 for the step of communicating. Note discussion of claim 7 for the step of providing. As to determining correspondence between the plurality of tasks and the plurality of local processes, this is met by Zolnowsky in that a local process/thread in a processor's own dispatch queue corresponds to a lower priority task compared with a process/thread in the global real time queue (col. 5, lines 16-58).

As to claim 12, Zolnowsky teaches invoking operating system priorities to schedule tasks in accordance with the prioritized schedule in that Zolnowsky implements the priority scheduling in the underlying operating system (col. 5, lines 55-57).

As to claim 13, Zolnowsky as modified teaches communicating the global prioritized schedule of tasks to the at least one computing node (Cameron, discussion of claim 6). It is noted that the global scheduler means is remotely located with respect to the at least one computing (multiprocessor system).

As to claim 14, note discussion of claim 5.

As to claim 16, note discussion of claim 11 except for dynamically creating a prioritized schedule of the plurality of tasks; determining correspondence between the plurality of tasks and the plurality of local processes; and dynamically prioritizing the local processes in accordance with the prioritized schedule. Zolnowsky further teaches executing (execution) and communicating information about execution (affinity) until all tasks have been completed (processor which last ran the thread). See col. 6, line 61 - col. 7, line 49. Zolnowsky repeats these scheduling steps when scheduling each thread for execution.

As to claim 17, note discussion of claim 3.

As to claim 18, Zolnowsky as modified teaches the remotely located scheduler dynamically maintaining at least one list of the at least one computing node (Cameron, layer data 738, col. 9, lines 23-37).

As to claim 19, Zolnowsky teaches the scheduler means is adapted to automatically update the local priority list (see discussion of claim 1).

As to claim 20, Zolnowsky teaches receiving task information (thread's scheduling variables such as affinity, priority) from at least one of an application coordinator and the more than one computing node (communicated with other processors, col. 7, lines 24-43); and maintaining an activity scheduler list (scheduler 1, 2, ..., N) relating to available processes at the computing nodes (associated with respective processors) and an activity priority list based on the task information (dispatch queues, fig.s 4A, 4B).

7.   Applicant's arguments filed 1/22/2003 have been considered but are moot in view of the new ground(s) of rejection.

8.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sue Lao whose telephone number is (703) 305-9657. A voice mail service is also available at this number. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7238 for After Final communications, (703) 746-7239 for Official communications and (703) 746-7240 for Non-Official/Draft communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-9600.

Sue Lao

August 8, 2003